nas **Belouad**i

Mannheim, Baden-Württemberg, Germany

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Summary.

As a fourth-year doctoral researcher at the University of Mannheim, I study the limitations of large language models in resource-constrained multimodal and multilingual settings. My specific focus is the intersection of multimodal learning and neural program synthesis, particularly in graphics program synthesis with vision-language models. This field explores how multimodal AI systems can generate programs that compile to visual media. I also have experience with pre-training token-free language models for style-conditioned poetry generation without the need for manually imposed stylistic constraints, as well as developing unsupervised evaluation metrics for machine translation of low-resource languages.

Higher Education

University of Mannheim & Bielefeld University

Mannheim & Bielefeld, Germany

Ph.D. IN COMPUTER SCIENCE

May 2022 - Present

- Focus: Natural Language Processing & Machine Learning
- · Topic: Multimodal and Multilingual Text Generation and its Evaluation under Resource Constraints

Darmstadt University of Technology

Apr. 2019 - Oct. 2021

M.Sc. in Computer Science with minor in Electrical Engineering

- · Graduated with honors
- Final grade: 1.29 (German 5-point scale)
- Thesis topic: Self-Learning for Unsupervised Evaluation Metrics
 - Third place in university-wide thesis competition

Darmstadt University of Technology

B.Sc. IN COMPUTER SCIENCE

• Final grade: 1.48 (German 5-point scale)

• Thesis topic: Text Generation from Knowledge Bases

Oct. 2016 - Mar. 2019

Experience _____

Adobe Research

RESEARCH INTERNSHIP Apr. 2025 - Sep. 2025

• Explored procedural material generation with large vision-language models.

National Institute of Information and Communications Technology (NICT)

Kyoto, Japan

RESEADON INTERNISHID

Aug. 2024 - Mar. 2025

• Conducted research on zero-shot text-guided graphics program synthesis.

Natural Language Learning Group (NLLG)

RESEARCH & TEACHING ASSISTANT

Nov. 2021 - Feb. 2022

- Conducated research on new evaluation metrics for machine translation.
- Assisted in organizing lectures and seminars on Natural Language Processing.

Achievements_

AWARDS

ACL Honorable Mention, Proceedings of the 61st Annual Meeting of the Association for Computational 2023

EACL Outstanding Paper, Proceedings of the 17th Conference of the European Chapter of the Association for 2023 **Computational Linguistics**

FELLOWSHIPS

2024	NICT Research Fellowship, Financial support to facilitate international research collaborations.	Project funding
2024	Google Cloud Platform Credit Award, Financial aid for selected academic research projects.	Project funding
2020	PROMOS , Scholarship for students completing academic stays abroad.	Monthly grant
2019	Deutschlandstipendium , Scholarship for high-achieving and committed students from all over the world.	Monthly grant

TECHNOLOGIES

Programming Python, C, C++, Bash, Java, Lua

Frameworks & Libraries PyTorch, HuggingFace Transformers, Sentence Transformers, NumPy, Pandas

Development & Deployment Git, Linux, শ-x, Docker, Neovim, Gradio, HuggingFace Spaces, Google Colab, Slurm

OPEN-SOURCE PROJECTS

DeTikZify Automated synthesis of graphics programs for scientific figures and sketches.

AutomaTikZ Automated synthesis of scientific vector graphics using text captions.

pantran.nvim Plugin that provides machine translation functionality within the Neovim text editor.

uniformers Library for token-free, character-level language modeling.

umetrics Library for experimenting with reference-free evaluation metrics for machine translation.

LANGUAGES

German Native proficiency

English Full professional proficiency **Japanese** Limited working proficiency

Limited working proficiency

Selected Publications

CONFERENCE PROCEEDINGS

TikZero: Zero-Shot Text-Guided Graphics Program Synthesis

Jonas Belouadi, Eddy Ilg, Margret Keuper, Hideki Tanaka, Masao Utiyama, Raj Dabre, Steffen Eger, Simone Paolo Ponzetto *Proceedings of the IEEE/CVF International Conference on Computer Vision*, 2025, Honolulu, Hawaii

DeTikZify: Synthesizing Graphics Programs for Scientific Figures and Sketches with TikZ

Jonas Belouadi, Simone Paolo Ponzetto, Steffen Eger

The Thirty-eighth Annual Conference on Neural Information Processing Systems, 2024, Vancouver, Canada

AutomaTikZ: Text-Guided Synthesis of Scientific Vector Graphics with TikZ

Jonas Belouadi, Anne Lauscher, Steffen Eger

The Twelfth International Conference on Learning Representations, 2024, Vienna, Austria

ByGPT5: End-to-End Style-conditioned Poetry Generation with Token-free Language Models

Jonas Belouadi, Steffen Eger

Proceedings of the 61st Annual Meeting of the Association for Computational Linguistics, 2023, Toronto, Canada

 ${\tt UScore: An\ Effective\ Approach\ to\ Fully\ Unsupervised\ Evaluation\ Metrics\ for\ Machine\ Translation}$

Jonas Belouadi, Steffen Eger

Proceedings of the 17th Conference of the European Chapter of the Association for Computational Linguistics, 2023, Dubrovnik, Croatia

ScImage: How Good are Multimodal Large Language Models at Scientific Text-to-Image Generation?

Leixin Zhang, Steffen Eger, Yinjie Cheng, Weihe Zhai, Jonas Belouadi, Fahimeh Moafian, Zhixue Zhao

The Thirteenth International Conference on Learning Representations, 2025

Reproducibility Issues for BERT-based Evaluation Metrics

Yanran Chen, **Jonas Belouadi**, Steffen Eger

Proceedings of the 2022 Conference on Empirical Methods in Natural Language Processing, 2022, Abu Dhabi, United Arab Emirates

JOURNAL ARTICLES

ChatGPT: A Meta-Analysis after 2.5 Months

Christoph Leiter, Ran Zhang, Yanran Chen, **Jonas Belouadi**, Daniil Larionov, Vivian Fresen, Steffen Eger *Machine Learning with Applications* (June 2024) p. 100541. Elsevier, 2024

PREPRINTS

MultiMat: Multimodal Program Synthesis for Procedural Materials using Large Multimodal Models

Jonas Belouadi, Tamy Boubekeur, Adrien Kaiser

Belouadi

arXiv:2509.22151 [cs.CV], 2025

Jonas Belouadi